ADVANCED DIPLOMA OF ELECTRICAL AND INSTRUMENTATION (E&I)
ENGINEERING FOR OIL AND GAS FACILITIES

MODULE DETAILS

MODULE 19: SCADA and Distributed Control Systems

Nominal duration: 4 weeks (32 hours total time commitment)

This time commitment includes the preparation reading, attendance at each webinar (1 hour plus 15-30 minutes for discussion), and the time necessary to complete the assignments and further study.

MODULE PURPOSE

SCADA has traditionally meant a window into the process or a plant, or gathering of data from devices in the field, but now the focus is on integrating this process data into the actual business and using it in real time. The emphasis today is on using 'open' standards such as IEC 60870, DNP3 and TCP/IP and 'commercial-off-the-shelf' (COTS) hardware and software to keep the costs down.

The first part of the module covers the essentials of SCADA systems, such as found with water and electrical utilities. This gives an introduction to the SCADA hardware and software. It then focuses on the main plant communication systems using Industrial Ethernet and one or more of the field buses. Finally, there is an examination of many of the common issues involved in all SCADA systems. These include Alarm Management, Human Machine Interfaces (HMI), network security, Historians, troubleshooting, maintenance and specification issues.

This module also covers the practical application of modern Distributed Control System (DCSs). Whilst all control systems today are distributed to a certain extent, there is a definite merging of the concepts of DCS, PLCs and SCADA.

PRE-REQUISITE MODULES/UNIT(S)

None

ASSESSMENT STRATEGY

To evaluate the achievement of the learning outcomes; written assignments, group projects and practical exercises are set.

SUMMARY OF LEARNING OUTCOMES

1. Describe the use of SCADA for monitoring installations across a wide geographical area [19.1]
2. Describe the use of SCADA for process plants [19.2]
3. Explain the essentials of DCSs [19.3]
4. Describe DCS operator interfacing, control and implementation [19.4]

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Learning Outcome 1	**Describe the use of SCADA for monitoring installations across a wide geographical area**	**[19.1]**
Assessment Criteria	1. Explain the concept of 'wide area' SCADA systems	[19.1.1]
	2. Describe basic SCADA system hardware	[19.1.2]
	3. Identify commercial SCADA system software	[19.1.3]
	4. Discuss SCADA communication protocols	[19.1.4]
	5. Discuss Human Machine Interface (HMI) systems for SCADA applications	[19.1.5]
Learning Outcome 2	**Describe the use of SCADA in process plants**	**[19.2]**
Assessment Criteria	1. Examine and discuss process plant SCADA systems	[19.2.1]
	2. Discuss issues related to SCADA alarm management	[19.2.2]
	3. Discuss issues related to SCADA network security	[19.2.3]
	4. Describe the functions of a SCADA historian	[19.2.4]
	5. Discuss considerations in SCADA system installation and commissioning	[19.2.5]
	6. Discuss SCADA system troubleshooting and maintenance	[19.2.6]
Learning Outcome 3	**Explain the essentials of DCSs**	**[19.3]**
Assessment Criteria	1. Examine the differences between DCSs, SCADA systems and PLCs	[19.3.1]
	2. Describe DCS system elements	[19.3.2]
	3. Describe DCS data communications	[19.3.3]
	4. Discuss the configuration and programming of DCS controllers	[19.3.4]
	5. Discuss uninterrupted operation and security issues with regards to DCS	[19.3.5]

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Learning Outcome 4	**Describe operator interfacing, control and implementation**	**[19.4]**
Assessment Criteria	1. Discuss DCS operator interfacing	[19.4.1]
	2. Discuss DCS control in terms of:	
	(a) DCS controller configuration	[19.4.2]
	(b) Advanced control strategies	[19.4.3]
	3. Examine and discuss DCS implementation issues	[19.4.4]

Delivery Mode

A combination of asynchronous and synchronous e-learning delivery comprising a judicious mix of interactive online web conferencing, simulation (virtual labs) software, remote online labs, online videos, Power Points, notes, reading and study materials (in pdf, html and word format) accessed through the Moodle Learning Management System (LMS).